Paper presented in the IV Globelics Conference at Mexico City, September 22-24 2008

Emerging centres of excellence: Knowledge-sharing between developing country firms and their subsidiaries in the developed world

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INTRODUCTION

This paper investigates how developing country firms with generally less developed capability bases than their counterparts from the developed world can benefit from their location in the technologically more advanced developed world. It documents that subsidiaries in more developed countries do act as centres of excellence for their firm, but that their role as such centres of excellence is still emerging, and characterised by less formal, less optimal knowledge sharing mechanisms. In addition, firms learn more if they are more similar (whether seen in terms of industrial competitiveness or institutional infrastructure) to their host country.

The paper follows the traditional format: The theoretical model is discussed, hypotheses derived, and the methodology explained. The paper ends with a presentation and discussion of results, and a conclusion with suggestions for further research.

THEORETICAL MODEL

Numerous factors affect the extent to which subsidiaries share useful knowledge with the parent in the less developed country, but two main factors can be identified. First, the subsidiary has to succeed in developing new capabilities in its host location. The literature streams on subsidiary mandates (Andersson, 2003, Birkinshaw & Hood, 1998, Cantwell & Mudambi, 2005) and on centres of excellence (Andersson & Forsgren, 2000, Frost, Birkinshaw, & Ensign, 2002) both indicate that a parent will seek to learn from a subsidiary to the extent that the subsidiary is recognised as a source of potentially useful new capabilities. It is therefore important to determine how the subsidiary develops into a centre of excellence which Frost et al (2002) define as a subsidiary with capabilities that are a) advanced, b) recognised by and c) useful for the parent organization.

Secondly, there has to be a flow of knowledge from the subsidiary to the parent. Some knowledge can be expected to spread through the organization through existing relationships and incidental contact, but the effectiveness of knowledge sharing can be enhanced by more extensive activities for knowledge exchange. Cummings and Teng (2003) identify a number

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of frequently mentioned knowledge sharing activities in the literature, including site visits, clarifying communications and problem solving management meetings. These activities are similar to the teaching and learning activities documented in Zhao, Anand and Mitchell (2004) and both document that parties must be active participants in their learning. The extent of teaching and learning activities therefore also determines the extent of knowledge that, once created in the developed world, is shared with the parent.

My main argument (see the shaded blocks in Figure 1) is that the extent of knowledge shared with the parent is determined firstly by the extent to which the subsidiary acts as centre of excellence, i.e. succeeds in creating useful new competencies for the firm at large, and secondly by the extent of knowledge sharing between the parent and subsidiary. In fact, this general argument is likely to hold for firms at all levels of development. However, developing country firms with their less extensive capability bases are likely to face particular challenges in both the creation of new knowledge in interaction with their more developed host environment and in the within-firm sharing of knowledge. The constraints posed by their more limited resource base are thus likely to affect the functioning of all three concepts that underlie this general form of the argument – centre of excellence status, the extent of learning and teaching strategies employed, and the sharing of knowledge with the parent.

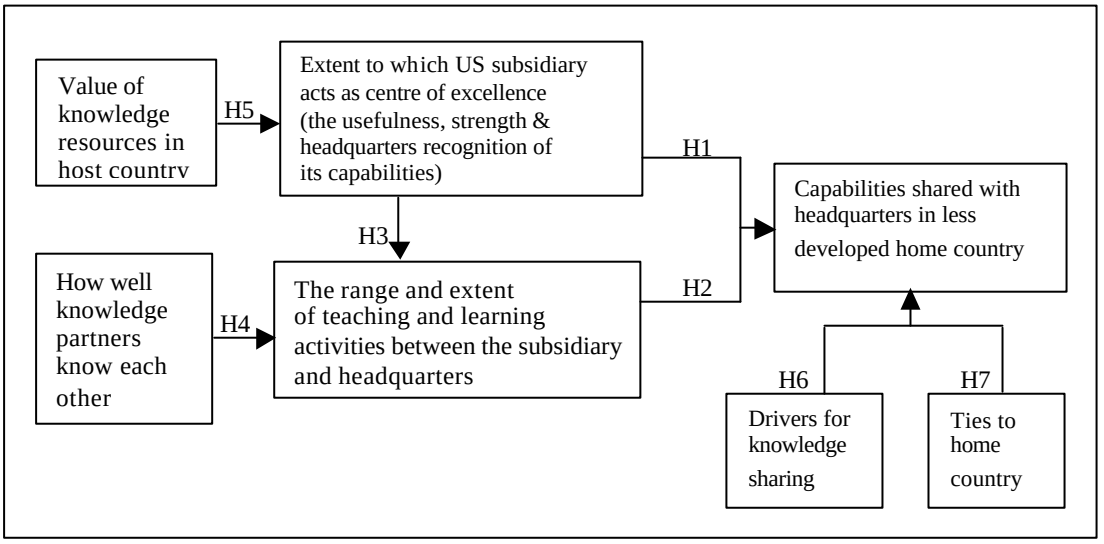

Figure 1: Theoretical model of knowledge sharing by developing country firms

Becoming a centre of excellence

Developing country firms do not become more competitive (expand their resource base) simply by virtue of being geographically located in a technologically more advanced location. They need to draw on the knowledge resources of the host location in order to expand their capabilities. The central argument of Cohen and Levinthal (1990, 1989) is that firms' existing resource base shapes the extent to which they can draw on other resources. In turn, original formulation of the resource-based view of the firm (Penrose, 1955, Penrose, 1959) suggests that limitations in the resource base of firms force a trade-off. If the bulk of

the resources of developing country firms in the developed world are already deployed trying to survive in the more competitive location, they may not available for deliberate knowledge creation.

In considering how subsidiaries of developing country firms become centres of excellence for the firm, one important consideration is therefore how firms gain access to the knowledge in a location. One important option is that firms gain access to the knowledge in a location through their relationships, and an extensive literature exists on the role played by relational factors in firm learning. "Relational assets" (Dunning & Narula, 2004) are essentially facilitating in nature and encompass the benefits that firms derive from a wide range of relationship-related dimensions. Researchers have parcelled out the effects of for example trust (Huemer, von Krogh, & Roos, 1998, Levin & Cross, 2004, Loasby, 1999), social networks (Cho & Lee, 2003, Gulati, 1999), and relationship quality (Szulanski, 2000, Szulanski, 1995) on learning. Relational assets are resources with the qualities needed to confer a sustainable competitive advantage (Barney, 1991) and thus form part of the ownership advantages of firms that firms may or may not have.

The generally more limited resource base of developing country firms is particularly unlikely to consist of significant relational assets. Instead, the ownership advantage of those firms is more likely to biased towards capital assets. To the extent that the internationalization of Chinese and Middle Eastern firms is supported by the strong trade balances of their home countries, they present an extreme example. However, the greater ease with which firms can access capital rather than relational assets is likely to be generally true of developing country firms. Although firms cannot transfer their relational assets from their home countries and regions to the developed world, they can transfer funds generated in those contexts.

This leaves firms with the option of purchasing their needed knowledge, for example in the case of technology embedded in capital goods. The limitations of a transaction-based approach within the context of knowledge acquisition are well understood (e.g. Kogut & Zander, 1992), and form some of the central arguments why less developed countries stand to benefit from investment by leading MNCs (Lall, 2001, Narula & Dunning, 2000). However, the purchase of knowledge is an accessible – if not optimal – mechanism for upgrading. It is important to note that the distinction between relational and transactional modes for acquiring knowledge cannot be considered absolute. Although the two are conceptually distinct, in practice knowledge acquisition often has both a transactional and a relational dimension, for example when it takes place through tight-knit supplier relationships. Still, in understanding how firms establish themselves initially in a host context, it is useful to consider whether there is a transactional dimension to the knowledge acquisition – when a market-based transaction can facilitate knowledge acquisition – or whether knowledge is acquired in a context where the relationship is central, for example in interaction with public advisory agencies.

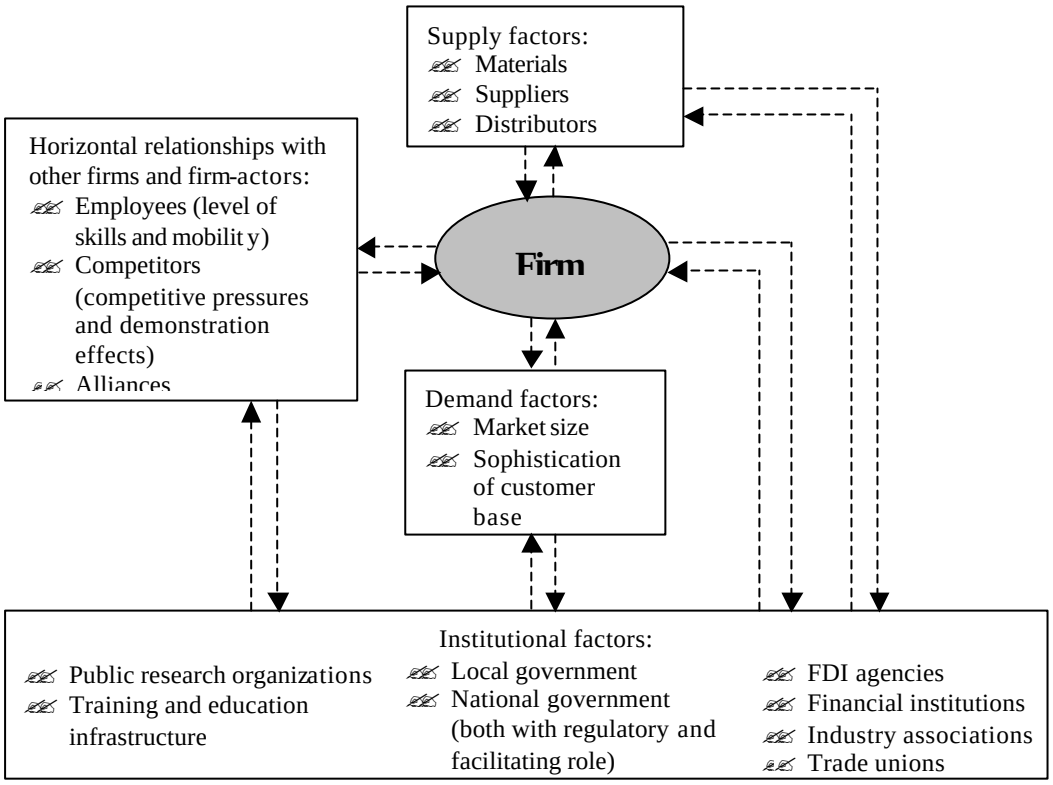

Figure 2: External actors that can support innovation by the firm

The other important aspect for understanding how subsidiaries become centres of excellence for developing country firms is the types of knowledge resources that firms draw on in expanding their capability base. It is very well established that firms' capability development – precisely because it takes place in an evolutionary manner – follows idiosyncratic paths (Cantwell, 1991, Cantwell & Kosmopoulou, 2003, Dosi, 1999, Lall & Teubal, 2001, Teece, 2000). Although firms' capability development is likewise supported by a very wide range of actors, it is possible to group them into four main types of actors. Figure 2 summarises the actors.

The first set of potentially beneficial actors in a location is related to supply factors. Within a supply chain, all relationships have a transactional dimension, but firms do benefit from more competent and skilled suppliers or distributors (Dyer, 1996, Florida & Kenny, 2000). Firms may also choose to improve their efficiency to overcome constraints posed by the higher costs of materials or equipment. Within a vertical supply chain, partners benefit from mutually strengthening each other, and it is likely that developing country firms will find their suppliers and distributors valuable sources of useful capabilities.

At the horizontal level, employees – also a relationship type with a transactional dimension – are similarly likely to play a similar enabling role. Employees, whether of own or competitor firms, have been identified as important sources of knowledge (Almeida & Kogut, 1999, Saxenian, 1994, Song, Almeida, & Wu, 2003). Employees benefit through continued

employment and advancement to the extent that their firms succeed, and they are therefore likely to contribute to the capability expansion of their firms.

The same cannot necessarily be said of competitor firms, another set of actors functioning at the horizontal level. Competitors (often but not always within the context of alliances) enable learning and strengthen the performance of an industry overall (Dunning, 1958, Gulati, Norhia, & Zaheer, 2000, Hamel, 1991). However, over the short term competition has an adverse effect – an effect that is especially likely to be felt by the relatively less competitive firms from the developing world.

The third set of factors is demand factors. Customers can act as "lead users", sources of innovation themselves (Von Hippel, 1986, Von Hippel, 1988), but even when they do not, a sophisticated consumer demands a better product or service, forcing the firm to improve its offering or lose the customer. Market seeking is the dominant motive for the international expansion of developing country firms (World Investment Report, 2006) and it can be argued that significant learning takes place as firms seek to meet the demands of customers. From the point of view of the firm, knowledge acquisition from customers or lead users has a relational rather than a transactional dimension. Firms cannot purchase the relevant knowledge, and instead learn because customers choose to engage with them rather than go to a competitor. Developing country firms lack the relationships in the developed world, and are therefore unlikely to be pro-actively sought out by customers. Instead, firms' learning from their customer base is likely to be reactive, and perhaps even associated with some adverse effects, as in the case for stronger competition.

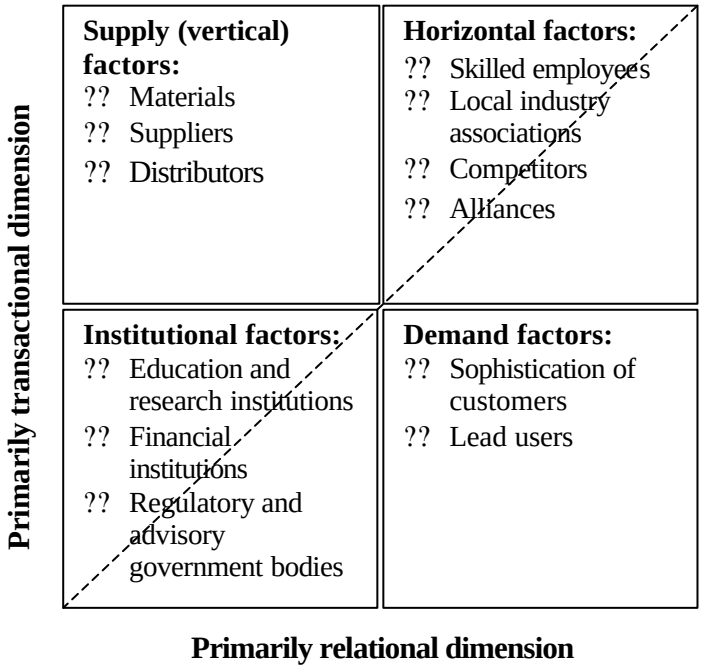

Figure 3: Review of actors in the host location and the primary mode of accessing their knowledge

Finally, there is a public infrastructure that firms can draw on. The role of institutions is increasingly recognised as one of the central determinants of the competitiveness (or not) of a location (Murmann, 2003, Nelson, 2002, North, 1990). The public infrastructure is generally regarded as a common good, and most institutions, e.g. the financial infrastructure and regulatory and advisory bodies, are potentially available for all actors in a location with the relational assets to take advantage of that infrastructure. However, following the realization of the inadequacy of a purely science-led paradigm (Hounshell, 1996) and the Bayh-Dole act (Sampat, Mowery, & Ziedonis, 2003) there has been increasingly a commercial dimension to universities' research, and interaction with those parts of the institutional infrastructure (specifically institutions concerned with learning like universities and research institutions) may have a transactional dimension.

The combined relationship between the actors in a location and the primary (transactional or relational) mode of accessing the knowledge of those actors is summarised in Figure 3. I argue that the mode of accessing resources is an important determinant of whether the relatively less competitive developing country firms will gain access to the desired knowledge. In a similar type of argument, Appleyard (1996) documents that Japanese firms in the US rely more heavily on public rather than private sources of knowledge than their domestic counterparts, suggesting that the modes of access to information differ for local and foreign firms. Because capital assets are an easier asset to accumulate and transfer than relational assets, I argue that developing country firms are most likely to benefit from the resources of their host location with a transactional dimension. Stated differently, resources with a transactional dimension allow firms to overcome some of the limitations of their more limited resource base. Over time, firms may be able to accumulate the requisite relational and other ownership assets to also benefit from the potential host country resources with a primarily relational dimension.

Sharing capabilities with the parent

Although the difference between relational and transactional modes of accessing new knowledge is relevant in determining how the developing country firm interacts with its foreign host environment to develop new capabilities, for within-firm sharing it is not a very useful distinction. Although the valued capabilities of a developing country firm may appear limited from the vantage point of leading firms, the basic processes of within-firm knowledge sharing are likely to be the same for both. The fact that a subsidiary is recognised as technically proficient, i.e. has developed status as a centre of excellence, is in and of itself likely to increase the extent of teaching and learning activities: Recognition that the subsidiary possesses useful capabilities is likely to prompt knowledge-seeking and knowledge-sharing behaviour from actors within the MNC. In addition, the stronger the relationships between actors in the subsidiary and in the parent, the more teaching and learning can be expected. That the firm acts as a community that facilitates the exchange of knowledge has been repeatedly documented (Kogut & Zander, 1996, Loasby, 1999, Orlikowski, 2002). To the extent that the firm does act as community – regardless of the extent of the capability base of the firm – how well actors know each other is likely to play an important role in facilitating knowledge sharing.

The core of the proposed theoretical model is that the extent of capabilities shared with the parent in the less developed country is affected by both the centre of excellence

status of the subsidiary of the developing country firm, and by the extent of learning and teaching activities between the subsidiary and the parent. However, two additional factors are likely to directly affect the extent of knowledge shared with the parent in ways that are particular to the relatively less advanced firms from developing countries.

The first is the drivers of knowledge sharing. As firms accumulate capabilities and evolve into distributed networks of knowledge creation, leading subsidiaries may increasing act as centres of excellence with a formal mandate to share capabilities with the rest of the firm (Andersson, 2002, Andersson, 2003, Frost, Birkinshaw, & Ensign, 2002). The development of this formal mandate is an evolutionary process, with subsidiaries assuming increasingly important roles in the organization (Birkinshaw & Hood, 1998, Mudambi & Navarra, 2004). The explicit knowledge seeking that has been documented in these cases (e.g. Cantwell, 1989, Chung & Alcacer, 2002, Kuemmerle, 1999) is not simply a "by-product" of presence in a technically advanced context, but a central reason for being there. Because of their limited absorptive capacity it is rare for developing country firms to engage in pure created asset seeking (World Investment Report, 2006). Formally mandated knowledge exchange is therefore not likely to be a central driver for sharing knowledge with the parent. In fact, in an argument that is central to both Penrose's work and evolutionary economists, to the extent that firms are constrained by an internal capability base that is still inadequate to function effectively in the developed world, it is even likely that knowledge sharing will suffer if the subsidiaries of developing country firms are given a formal mandate to share knowledge.

However, formal drivers are not a precondition for knowledge sharing; it can also take place through "learning-by-doing". The essence of learning-by-doing is that firms learn in the course of normal business activities. In fact, learning theorists (Brown & Duguid, 2001, Brown & Duguid, 1991, Lave & Wenger, 1991, Orlikowski, 2002) point out that learning is always situated, and that the distinction between learning and working is often little more than an academic construct. For example, Miner, Bassof, and Moorman find that knowledge creation was never an explicit goal in their study of one "low technology" (food products) and one "high technology" firm (technological products for industrial clients and research laboratories). Rather, new knowledge was always the "collateral outcome" of improvisation, experimentation and trial-and-error learning (2001:318). This less formal process of capability development has been extensively documented in developing country contexts (Bell & Pavitt, 1992, Katz, 2000, Lall, 1999, Miotti & Sachwald, 2001, Pack, 2000, Teece, 2000, Tolentino, 1993) and it is likely that it would be the main driver of knowledge sharing between the parent and subsidiaries of developing country firms.

A second important consideration affecting the extent of capabilities shared with the parent is that of ties to the less developed country. Stronger ties between the home country and developed country units are likely to help parties anticipate which capabilities are particularly useful, and in which ways capabilities must be adapted in order to be of firm-wide use, and thus contribute to the sharing of capabilities with the parent.

In the developed world, professional ties play an important role in facilitating knowledge sharing. Orlikowski (2002) and Zhao, Anand, and Mitchell (2005) find the importance of developing knowledge sharing networks, while Gupta and Govindarajan (2000) find support for two types of within-firm professional ties, prior work experience at headquarters, and also a relationship with a mentor at headquarters. In work on the expansion

of developing country firms, however, personal ties have been most often documented. Home country nationals and transnational communities have been found to facilitate not only capability development in a host location but also knowledge flows back to the home country (Cho & Lee, 2003, Saxenian, 2002, Saxenian & Hsu, 2001). To the extent that executives have an understanding of the networks of both the home and the host countries, they can play an important bridging role between the two contexts. Both personal and professional ties are likely to facilitate knowledge sharing, but in keeping with the overall argument that capability development for the technologically less sophisticated developing country firms takes place in an incremental fashion, the role of personal networks is expected to be more important than that of professional networks.

In sum, developing country firms are not a completely different "breed" of firm, and the basic processes by which they not only develop capabilities in technologically more advanced locations, but also share those capabilities with the parent in the home country are very similar to the processes used by more developed firms. However, their less extensive capability base does constrain their capability development. In the case of learning from a more advanced location, their weaker internal resource base forces them to rely more on knowledge sources from the host environment with a transactional rather than relational dimension. In the case of sharing with the parent, the drivers tend to be less rather than more formal, reflecting that subsidiaries' capabilities and indeed strategic mandate are still at a relatively earlier stage of development.

HYPOTHESES

A central assumption of this paper is that many of the knowledge creation and sharing strategies used by developing country firms are in essence the same as those used by more advanced firms. However, it is important to formally test that assumption, and therefore the first four hypotheses replicate findings that are already quite well established in prior literature on subsidiaries and the capability expansion of firms from the developed world. The hypotheses related to the extent of capabilities that are shared with the subsidiary in the home country are:

H1: The greater the extent to which the subsidiary in the developed world is a centre of excellence, the greater is the sharing of capabilities with the parent in the less developed country.

H2: The greater the extent of learning and teaching strategies between the subsidiary in the developed world and the parent, the greater is the sharing of capabilities with the parent in the less developed country.

In explaining the range and extent of teaching and learning strategies used, developing country firms are also not likely to differ much from more advanced contexts, so that it is possible to hypothesize that:

H3: The greater the extent to which the developing country subsidiary has achieved centre of excellence status, the greater the range of teaching and learning strategies in which it engages.

H4: The stronger relationship between the developing country subsidiary and its headquarters, the greater the range of teaching and learning strategies in which it engages.

However, the relatively more limited ownership advantages (or internal resource base or capabilities) of the firm are likely to affect both the determinants of centre of excellence status, and how capabilities are ultimately shared with the home country. I argue that different resource types of the host environment will have different effects on the capability development of the firm. In fact, not all the potential "resources" of a highly advanced and competitive host environment will have a positive effect on the development of a relatively less advanced subsidiary into a centre of excellence for its firm. The notion of absorptive capacity (Cohen & Levinthal, 1990, Cohen & Levinthal, 1989) suggests that the firm must have a threshold capacity to benefit from the knowledge that circulates in an environment. Developing country firms are as a rule less competitive than their counterparts from the developed world, and therefore less able to source the knowledge in an environment. This is likely to have not only a neutral, but potentially even a negative effect as the relatively less advanced developing country firms are excluded from the virtuous processes of learning that further reinforce and expand the capabilities of the already more capable firms.

How developing country firms acquire the resources from the developed world is also relevant. As firms suffer the effects of not only their actual but also their perceived lack of competitiveness, it seems unlikely that they will have easy access to the knowledge networks of the developed world. However, although arguably the most valuable resources of the developed world require a stock of relational assets, other resources are available through arm's length transactions on the market. The market-based acquisition of resources allows developing country firms to circumvent some of the barriers posed by their outsider status, and their capability upgrading in the developed world is therefore most likely to rely on resources with a transactional dimension. Considering these factors jointly, it is possible to hypothesize:

H5a: The more sophisticated (transactional) supply factors of the host environment are positively correlated with centre of excellence status.

H5b: The more sophisticated horizontal inputs – with a *transactional* dimension – from the host environment are positively correlated with centre of excellence status.

H5c: The more sophisticated institutional infrastructure – with a *transactional* dimension – in the host environment is positively correlated with centre of excellence status.

H5d: The more sophisticated (relational) demand of the host environment is negatively correlated with centre of excellence status.

H5e: The more sophisticated horizontal inputs – with a *relational* dimension – from the host environment are negatively correlated with centre of excellence status.

H5f: The more sophisticated institutional infrastructure – with a *relational* dimension – in the host environment is negatively correlated with centre of excellence status.

As far as drivers for knowledge sharing are concerned, less formal learning-by-doing is likely to be more appropriate for firms with a more limited capability base than an attempt to formally share knowledge. Subsidiaries' mandates and their capability bases co-evolve (Birkinshaw & Hood, 1998) and firms that attempt to strategically mandate knowledge sharing by subsidiaries before the subsidiary has developed the necessary capability base to execute that mandate are simply intensifying the Penrosian-type trade-off faced by the subsidiary in the developed world. Some aspect will be neglected if subsidiaries with a limited capability base have to simultaneously manage expansion into foreign, technologically very competitive market and also formal knowledge sharing with the parent. I therefore hypothesize:

H6a: The more the subsidiary engages in joint learning-by-doing activities, the greater is the sharing of capabilities with the parent in the less developed country.

H6b: The greater the formal requirement from headquarters to share capabilities, the more limited is the sharing of capabilities with the parent in the less developed country.

Because subsidiary capabilities and mandates co-evolve, and because the subsidiaries of developing country firms in the developed world have relatively more limited capability bases, less rather than more formal mechanisms tend to be most appropriate for both creating and sharing capabilities. All interpersonal relationships are therefore likely to have a positive effect on knowledge sharing, although personal ties could perhaps be expected to have a greater effect than professional ties. I hypothesize:

H7a: The stronger executives' personal ties to the less developed home country, the greater is the sharing of capabilities with the parent in the less developed country.

H7b: The stronger executives' professional ties to the less developed home country, the greater is the sharing of capabilities with the parent in the less developed country.

METHODOLOGY

Quantitative data were gathered through a mail survey of the population of developing country firms in the US. The survey for developing country subsidiaries consists mainly of existing items, although some items have been adapted, and a few new items added in response to interviews with executives. A pre-test of the survey was conducted with senior executives of a globally active South African IT firm, and unclear items were dropped or changed. The group included both South Africans and executives of other nationalities.

Data gathering

A list of subsidiaries was obtained from the 2004 edition of the Uniworld Directory of Foreign Firms Operating in the US. Subsidiaries were telephonically contacted to verify contact details, and it often proved that subsidiaries had ceased operations in the USA, or consisted of little more than a front office. Those firms were removed from the database. To limit firm effects, where multiple subsidiaries of the same firm were listed, firms were asked

to identify the leading subsidiary. Multiple subsidiaries of a firm were included only if they were active in completely different areas, for example Hyundai Motors, Hyundai Heavy Industries etc. However, very few of the firms in the database are that diversified, and no responses were actually received from multiple subsidiaries of the same firm. Firms that were not true developing country firms but listed in tax havens in developing countries (e.g. the Bahamas) were also eliminated. A total of 441 surveys were sent out, with the geographic breakdown of home countries of subsidiaries as follows:

?? Africa and the Middle East – 108 firms
?? Asia excluding Japan – 223 firms
?? Latin America and the Caribbean – 110 firms

Surveys were marked for the attention of the local executive officer. In spite of multiple contacts by mail and telephone, the response rate was low – 53 surveys, or 12%. Although low, the response rate is not atypical for research on multinational subsidiaries (Frost, Birkinshaw, & Ensign, 2002, Harzing, 2000, Harzing, 1997) and probably reflects the dual difficulty of obtaining responses from executives and from developing country firms, both of whom are known to be challenging populations for survey-based data gathering (Bartholomew & Smith, 2006, Hoskisson, Eden, Lau, & Wright, 2000).

To determine the likelihood of non-response bias, differences in the response rate of firms from different countries, regions and industries were examined. At the national level, there is a slight over-representation of South African firms (probably because initial contact was made by a South African researcher) that compensates for the under-representation of most African and Middle Eastern firms. Similarly, there was under-representation of Chinese firms – quite a number of individuals from Chinese firms seemed concerned about permission to complete the survey, possibly reflecting the effects of government control. This was balanced out by (slight) increased response rates from South Korean, Taiwanese and Indian firms. However, at both the regional and industry level, differences between respondents and non-respondents were not significant. It therefore seems unlikely that the survey suffers from non-response bias, and the primary limitation of the small number of respondents is in terms of the available degrees of freedom, which limits the specificity of the analysis, and in a number of cases necessitates the use of composite indices or principal components rather than more fine-grained items.

Measures

Control (general) variables

A number of generally agreed control variables exist for studies of knowledge creation in a foreign environment (e.g. Andersson & Forsgren, 2000; Frost, 2001; Frost et al., 2002), and are included in the survey. They include entry mode, the level of intra-firm trade (measured by the average of sales to and purchases from other units of the organization), size (measured through number of employees, and reported in log form), and the age of the subsidiary. However, because this dissertation is concerned with the tension between the (more developed) host context and (less developed) resource base of the firm, they should be considered general explanatory variables that address the context within which all four theoretical models are formulated, and not purely as controls.

For example, both size and age in these analyses are likely to capture the dynamic nature of the process of upgrading. Because this research is concerned with the evolution of subsidiaries in the developed world, both their age (and therefore also their experience learning in the developed world) and their size (and by extension also the growing available resource base of subsidiary) can be expected to be positive.

The variables for industry and country-of-origin effects are also likely to signal how developing country firms interact with their technologically more advanced host environment. Rather than use qualitative variables to control for industry and country of origin, I develop quantitative variables to capture their likely effects. Both in terms of industry-level competitiveness and the country-level institutional infrastructure, developing country firms are likely to benefit from greater similarity between their industry or country, and that of the USA.

For the industry variable, I develop a measure of US competitiveness in the industry, using the proportion of US exports relative to world exports in that particular industry as indicator. Data are drawn from UNCTAD's Handbook of Statistics. The country-level variable is developed with particular reference to the (dis)similarity of the institutional environment that developing country firms face in their home countries versus in the USA. I calculate the average of three indicators, the constraints on executive decision-making powers, the use of institutions (rather than force or illegal means) to maintain law and order, and the feasibility of policy change (as determined by Henisz, 2002). To capture the effects of foreignness in the USA, I calculate the difference between the score of a given developing country and that of the USA, and use the difference in the analysis. The greater the value, the greater is the dissimilarity between the institutional environment of the home country of the firm and the USA.

Neither embeddedness with the rest of the firm nor entry mode proves significant in any of the models, and they also do not substantially affect the significance of the other variables. Given the large body of prior research on these two aspects, it is likely that they do indeed play a significant role in capability development and sharing. Whether the sample size is too small to uncover effects, or whether the variables function in ways that this study does not investigate is a topic for further research. However, to conserve degrees of freedom, results for all four models are reported without those variables.

Capabilities shared with the parent

Capability development is a central concept in this dissertation, but defining it presents a challenge. The survey is aimed at a diverse population that includes service and manufacturing firms, firms from different industries and from countries as different as Argentina and South Korea. I therefore deliberately use a range of terms to capture improved capabilities, including “better products, processes and services”, “distinctive competencies”, “technological information” and “types of expertise”. In other words, there is some loss of precision in order to achieve greater inclusiveness.

The ultimate outcome measure – the extent of capabilities shared with the headquarters – is obtained by asking subsidiaries first to determine what percentage of their total expertise developed in the USA is useful only in the USA, and what percentage is potentially useful for the rest of the firm. Respondents are then asked to focus only on the

potentially useful expertise that they have developed in the USA, and to estimate what percentage is "exchanged with or explained to headquarters".

Centre of excellence status

I follow Frost et al (2002) in defining centre of excellence status, and use their items to identify capabilities that are a) advanced, b) recognised by and c) useful for the parent organization. Frost and his co-authors construct centre of excellence status as a binary variable, but recognise that it may also be validly operationalised as a continuous variable.

Because I am concerned with how subsidiaries from developing country firms evolve into centres of excellence, I conceptualise centre of excellence status as a continuous variable, which allows me to consider firms at different points along the evolutionary path of developing into centres of excellence. Similarly, Frost et al also focus only on formal head office recognition, and include informal recognition only to test for robustness. Again, I prefer a more inclusive approach to allow me to capture the mechanisms at work where firms are still emerging as centres of excellence. I therefore consider both formal and informal recognition by the parent organization, although formal recognition is weighted more heavily.

Learning and teaching strategies

The measure for learning and teaching activities is derived from the "formal integrative measures" used by Gupta and Govindarajan (2000), and expanded to also include strategies that Cummings and Teng (2003) identify as the key factors affecting knowledge transfer success. In total, respondents are asked about fourteen knowledge sharing strategies, e.g. document exchanges, job rotation, permanent teams etc., and how often each of those strategies is used.

Where teaching and learning strategies are used as an outcome variable, a simple index is constructed of the range and frequency of all learning and teaching activities. However, where teaching and learning strategies are considered as a predictor, it is useful to be able to pinpoint the effects of specific strategies. A principal component analysis is conducted to group the fourteen strategies into components. Five components with an Eigenvalue of more than 1 break out. All five components are easily interpretable: the existence of permanent coordination mechanisms (liaison personnel and permanent teams), long-distance interaction (using document exchanges and clarifying communications), and three types of face-to-face interaction. One is characterised by the fact that it takes place at the company (rather than project) level and tends to involve general rather than project-related knowledge, for example company-wide conferences and joint management meetings. The other two are both project-related. One is characterised by joint participation on a job, e.g. site visits, joint technical training, job rotation or joint project development. The last one involves interaction that is prompted specifically by a problem, for example temporary task forces and problem-solving meetings.

Value of resources in the host environment

Respondents were asked to indicate on a 1-to-7 scale the extent to which they draw on various resources in the host environment to develop better processes, products or services. Each of the six categories indicated in Figure 3 contained more than one exemplar, for example both lead users and more demanding customers under demand factors, and both

increased competition and industry associations under relational horizontal factors. These alternatives proved to be highly correlated, and only one type of resource per category is included in the model.

Drivers for sharing knowledge

Items on the drivers for knowledge sharing between the subsidiary and headquarters are compiled from three sources: Frost et al (2002), Gupta and Govindarajan (2000) and Ivarsson and Jonsson (2003). These sources identify a total of five possible drivers, and they are all included in the survey. However, a principal component analysis identifies that these five combine into two main drivers. One component consists of only one item, the "formal requirement from head office". All four the other drivers load on the other component, and have in common that knowledge sharing results from less formal, learning-by-doing type of activities and interactions, for example the highest loading item under this component, that it is "inevitable if working with other unit(s) on projects" or that "other unit(s) request assistance or advice".

How well knowledge partners know each other

A 1-to-4 scale is used to determine how well executives know the key people of the rest of the firm when they share their expertise with them. It is a new item, but was pre-tested with executives who found it clear and easy to use.

Ties to the less developed home country

Unlike the item on how well knowledge partners know each other, which focuses on the dyadic relationship between actors from the subsidiary and parent, the measure of ties to the less developed country has a more general focus. Two types of ties are distinguished in this study, professional and personal. To measure professional ties, the "vertical socialization" items from Gupta and Govindarajan (2000) are used. They are prior experience at the headquarters, and the presence of a mentor at the headquarters.

Table 1: Correlation matrix for all variables used in analysis

	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.	N.	O.	P.	Q.	R.	S.	T.	U.	V.	W.	X.	Y.
A. Knowledge shared with headquarters	1																								
	.																								
B. Centre of excellence status	***0.32***	1																							
	0.02	.																							
C. Age	0.13	-.09	1																						
	0.39	0.53	.																						
D. Size	0.01	0.12	0.10	1																					
	0.93	0.40	0.49	.																					
E. Embeddedness	0.09	0.05	0.01	*-.25*	1																				
	0.54	0.73	0.96	*0.08*	.																				
F. Skilled employees	*0.27*	***0.28***	***-.30***	0.02	0.07	1																			
	0.05	***0.05***	***0.04***	0.88	0.62	.																			
G. Specialized suppliers	-.05	***0.32***	0.10	**0.39**	-.08	***0.33***	1																		
	0.75	***0.02***	0.51	**0.01**	0.57	***0.02***	.																		
H. Government agencies	-.09	-.16	0.13	0.17	-.06	0.03	**0.45**	1																	
	0.54	0.26	0.36	0.24	0.68	0.84	**0.00**	.																	
I. Research institutions	0.14	0.11	0.03	0.21	-0.04	0.19	**0.36**	**0.54**	1																
	0.32	0.46	0.85	0.16	0.77	0.19	**0.01**	**0.00**	.																
J. More demanding customers	-.07	-.02	-.19	-.14	0.14	**0.49**	0.01	-.02	0.01	1															
	0.63	0.91	0.19	0.32	0.34	**0.00**	0.97	0.90	0.96	.															
K. Increased competition	0.19	-.12	*-.28*	0.15	-.13	**0.49**	0.01	-.15		***0.33***	1														
	0.19	0.41	*0.05*	0.30	0.38	**0.00**	0.92	0.29		***0.02***	.														
L. How well partners know each other	0.19	0.13	*-.26*	*-.28*	0.17	*0.27*	0.14	0.01	-.20	0.20	0.04	1													
	0.20	0.38	*0.08*	*0.05*	0.27	*0.06*	0.33	0.96	0.16	0.16	0.78	.													
M. Task-focused face-to-face interaction	0.23	0.00	-.05	***0.35***	-.06	0.08	0.17	0.17	0.09	0.05	0.08	0.15	1												
	0.13	0.99	0.74	***0.02***	0.70	0.62	0.26	0.26	0.54	0.73	0.60	0.32	.												
N. General company-wide interaction	-.03	0.23	*0.27*	***0.38***	-.10	-.01	0.23	*0.29*	***0.29***	-.12	*-.26*	***-.33***	0	1											
	0.87	0.14	*0.08*	***0.01***	0.51	0.93	0.12	*0.05*	***0.05***	0.43	*0.09*	***0.03***	1	.											

	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.	N.	O.	P.	Q.	R.	S.	T.	U.	V.	W.	X.	Y.
O. Long-distance interaction	0.18	0.04	0.04	0.01	-.12	0.08	-.10	*-.27*	-.10	0.02	0.16	-.10	0.00	0.00	1										
	0.24	0.82	0.81	0.93	0.46	0.61	0.49	*0.08*	0.52	0.91	0.31	0.50	1.00	1.00	.										
P. Permanent coordinator positions	-.14	-.07	0.14	0.08	0.13	*-.26*	-.16	-.02	-.02	0.00	-.10	-.25	0.00	0.00	0.00	1									
	0.35	0.64	0.38	0.59	0.42	*0.08*	0.28	0.91	0.91	0.99	0.54	0.11	1.00	1.00	1.00	.									
Q. Problem-driven face-to-face interaction	***0.29***	*0.25*	-.03	-.10	-.05	0.16	-.01	-.04	0.06	0.21	***0.35***	0.04	0.00	0.00	0.00	0.00	1								
	0.05	*0.09*	0.85	0.52	0.77	0.30	0.95	0.80	0.69	0.16	***0.02***	0.78	1.00	1.00	1.00	1.00	.								
R. Knowledge sharing by learning-by-doing	0.22	0.08	-.15	0.08	**-.38**	*0.24*	***0.29***	***0.32***	0.05	0.01	0.12	-.10	0	0.13	-.10	***-.34***	0.05	1							
	0.12	0.58	0.31	0.56	**0.01**	*0.09*	***0.04***	***0.02***	0.70	0.97	0.41	0.50	0.99	0.41	0.53	***0.02***	0.76	.							
S. Knowledge sharing HQ mandated	-.07	0.09	0.07	0.15	0.09	-.21	0.04	0.07	0.22	0.01	0.02	-.21	0.13	0.06	-.04	***0.32***	-.02	0.00	1						
	0.62	0.51	0.66	0.29	0.55	0.15	0.80	0.64	0.12	0.97	0.87	0.15	0.39	0.67	0.77	***0.03***	0.91	1.00	.						
T. Personal ties to home country	0.03	0.11	0.00	-.05	-.05	0.10	0.14	0.10	0.13	0.23	-.05	***0.29***	0.10	-.08	-.04	-.15	-.12	0.18	0.14	1					
	0.82	0.43	0.99	0.72	0.75	0.50	0.31	0.50	0.35	0.10	0.72	***0.04***	0.53	0.61	0.81	0.32	0.45	0.22	0.33	.					
U. Work experience at home country HQ	*0.26*	***0.32***	0.03	0.21	-.09	0.14	***0.30***	0.17	0.05	0.10	-.04	*0.26*	0.16	0.13	0.22	-.21	-.03	0.22	0.22	**0.53**	1				
	0.07	***0.02***	0.83	0.14	0.54	0.35	***0.03***	0.25	0.77	0.50	0.80	*0.06*	0.29	0.40	0.14	0.17	0.86	0.12	0.12	**0.00**	.				
V. Mentor at home country HQ	**0.41**	***0.30***	-.01	-.11	0.04	0.02	0.16	0.05	0.14	-.17	-.16	0.21	0.13	-.07	-.07	-.14	-.16	0.14	***0.31***	*0.24*	**0.41**	1			
	0.00	***0.03***	0.95	0.47	0.80	0.89	0.27	0.76	0.33	0.25	0.26	0.14	0.38	0.64	0.63	0.36	0.31	0.34	***0.03***	*0.08*	**0.00**	.			
W. Range of teaching &	**0.47**	***0.31***	**-.39**	***0.28***	0.03	*0.27*	***0.29***	0.03	0.14	0.07	-.14	0.17	*0.37*	0.12	0.22	-.09	0.24	-.01	-.03	0.16	*0.26*	**0.37**	1		

	learning strategies	**0.00**	***0.02***	**0.00**	***0.05***	0.83	*0.06*	***0.04***	0.82	0.35	0.63	0.32	0.23	*0.01*	0.43	0.14	0.58	0.12	0.94	0.82	0.25	*0.06*	**0.01**	.		
X.	Competitiveness of US industry	-.19	*-.26*	-.07	-.08	0.08	0.05	-.17	-.04	-.19	0.19	-.01	-.02	0.09	0.03	0.05	0.05	-.27	0.06	*-.26*	-.05	-.16	-.14	0.03	1	
		0.17	*0.06*	0.63	0.57	0.60	0.71	0.21	0.80	0.19	0.19	0.95	0.87	0.55	0.84	0.74	0.74	0.07	0.70	*0.07*	0.73	0.25	0.33	0.82	.	
Y.	Institutional dissimilarity of country to US	0.09	0.18	0.20	0.16	-.06	***-.32***	-.02	-.06	-.12	-.18	***-.42***	-.10	-.02	0.01	-.08	0.07	-.23	-.01	***0.31***	0.14	0.19	***0.31***	-.15	-.16	1
		0.53	0.21	0.16	0.28	0.69	***0.02***	0.91	0.66	0.41	0.21	**0.00**	0.47	0.88	0.95	0.59	0.65	0.12	0.95	***0.03***	0.32	0.18	***0.03***	0.30	0.26	.

Significant at the 0.1 level
Significant at the 0.05 level
Significant at the 0.01 level

Following the work of Saxenian (2002) and Miotti and Sachwald (2001), personal home country ties are measured as a composite index of country of birth, highest educational qualification and current citizenship. Thus an individual who was born in the home country of the firm but not educated there will have a lower score than an individual who was born and educated there and still holds citizenship from that country.

Correlation matrix

Table 1 presents the bivariate Pearson correlation matrix of all the variables under study. Very few of the variables are significantly correlated, and when they are, the correlations are both intuitively understandable and conceptually clearly distinct. For example individuals with personal ties to the home country often also have professional ties to the home country firm, and work experience at the headquarters is often correlated with the presence of a mentor there. In another example, the presence of skilled employees in the host location is also correlated with stronger government agencies and specialised suppliers, all distinct dimensions of a generally better developed environment.

RESULTS

The model is broken into four sections, and each section is separately tested. First, the main argument of the model is tested: That the knowledge shared with the parent is a function of both the extent of learning and teaching strategies, and also the centre of excellence status of the subsidiary. Three more detailed analyses are conducted to better understand the determinants of the extent of teaching and learning strategies, centre of excellence status, and the extent of knowledge shared with the parent respectively. The next section presents the results for each section of the model in turn.

Table 2: Results for overall theoretical model

Outcome variable: Extent of potentially useful knowledge shared with the parent				
	Unstandardised beta	Std. error	t-value	Sig.
(Constant)	***56.505***	***21.319***	***2.650***	***0.011***
Age	0.358	0.316	1.131	0.264
Size	-4.616	4.742	-0.974	0.336
Relative competitiveness of US industry	-64.282	93.627	-0.687	0.496
Institutional dissimilarity of country to US	9.743	25.993	0.375	0.710
Centre of excellence status	*0.574*	*0.288*	*1.992*	*0.053*
Extent of teaching & learning strategies	***0.021***	***0.009***	***2.273***	***0.028***

Model summary	R	R^2	Adjusted R^2	Std. error of the estimate
	0.482	0.232	0.120	27.0482

ANOVA	Sum of squares	df	Mean square	F-value	Sig.
Regression	9085.378	6	1514.230	*2.070*	*0.078*
Residual	29995.872	41	731.607		
Total	39081.250	47			

Significant at the 0.1 level
Significant at the 0.05 level
Significant at the 0.01 level

Results for the overall theoretical model

The overall theoretical model holds that the parent in the less developed country will benefit from the presence of a subsidiary in the developed to the extent that the subsidiary acts as centre of excellence for the firm (H1), and to the extent that there is an active investment in teaching and learning between the parent and its subsidiary (H2).

Table 2 indicates some support for both H1 and H2. The overall model is marginally significant, with both the centre of excellence (albeit marginally) and the extent of teaching and learning strategies variables significant. None of the control variables are significant, suggesting that this model captures only a general process, and does not illuminate the detailed functioning of different elements. The subsequent sections go into more detail about each element.

Results for developing into a centre of excellence

Table 3, in keeping with prior research, documents that the resources available in a location play an important role in supporting the development of a subsidiary into a centre of excellence. The overall model is significant and has an adjusted R-square of 28.1%. Moreover, the model highlights the complex relationship between centre of excellence status and the available knowledge resources of a location.

The only factors contributing positively to a subsidiary's development into a centre of excellence are those with a transactional dimension, specialised suppliers and skilled employees. This offers support for H5a and H5b. As hypothesized, relational factors contribute negatively to centre of excellence development: Both increased competition (relating to H5e) and government agencies (related to H5f) are negatively significant. The most significant variables relate to the horizontal factors faced by firms; all the other factors are either marginally or not at all significant. In particular, the variables related to H5c, research institutions, and H5d, more demanding customers, do not prove to be significant. Additional work is needed to determine whether these variables are mis-specified, whether the sample size is too small to uncover their effects, or whether they in fact have a neutral effect on development into a centre of excellence.

Finally, only one control is significant: The relative competitiveness of the US industry is *negatively* correlated with development into a centre of excellence. Given the size and sophistication of the US economy, it is likely that even its relatively weaker industries still possess significant capabilities, although probably not frontier technologies. The fact that firms from developing countries learn most from these relative "laggards" is in agreement with the absorptive capacity argument (Cohen & Levinthal, 1990, Cohen & Levinthal, 1989): The capabilities of firms in the most competitive US industries are too advanced for developing country firms to benefit from them. The data offer evidence that developing country firms go through an incremental, cumulative process of capability development, and do not simply leapfrog into positions of strength.

Table 3: Results for developing into a centre of excellence

Outcome variable: Centre of excellence status	Unstandardized beta	Std. error	t-value	Sig.
(Constant)	22.681	13.892	1.633	0.111
Age	-0.063	0.156	-0.406	0.687
Sise	0.367	2.320	.158	0.875
Relative competitiveness of US industry	***-100.434***	***44.581***	***-2.253***	***0.030***
Institutional dissimilarity of country to US	12.278	13.921	0.882	0.384
DEMAND FACTORS				
More demanding customers	1.362	1.666	0.818	0.419
SUPPLY FACTORS				
Specialised suppliers	*2.471*	*1.372*	*1.801*	*0.080*
HORIZONTAL FACTORS				
Increased competition	***-3.790***	***1.807***	***-2.097***	***0.043***
Highly skilled employees	***3.608***	***1.379***	***2.616***	***0.013***
INSTITUTIONAL FACTORS				
Government agencies	*-2.622*	*1.378*	*-1.903*	*0.065*
Research institutions	1.676	1.471	1.139	0.262

Model summary	R	R^2	Adjusted R^2	Std. error of the estimate
	0.661	0.437	0.281	12.6061

ANOVA	Sum of squares	df	Mean square	F-value	Sig.
Regression	4447.301	10	444.730	***2.799***	***0.011***
Residual	5720.930	36	158.915		
Total	10168.232	46			

Significant at the 0.1 level
Significant at the 0.05 level

Results for deciding to engage in teaching and learning activities

The process by which developing country units in the developed world decide to engage in teaching and learning activities is likely to be quite similar to that of more advanced firms. The mere fact that the unit is regarded as technically capable, i.e. a centre of excellence, is likely to increase the likelihood that it will engage in teaching and learning activities (H3). But the relational dimension, specifically how well the subsidiary knows its knowledge partners, is likely to also play a role (H4). The results (Table 4) show strong support for both hypotheses. The overall model is highly significant and has an R-square of 41.1%. Both centre of excellence status and how well knowledge partners know each other are highly significant, confirming prior research.

The control variables offer perhaps the most interesting insights into the evolution of developing country firms' intra-firm learning and teaching. The age and size of the subsidiary are both significant, confirming the appropriateness of an evolutionary framework for considering the development and spread of capabilities and knowledge

sharing mandate within an organization. The subsidiaries of developing country firms do over time and as they expand their resource base become better at sharing new knowledge with the rest of the firm. In addition, institutional dissimilarity is negatively correlated with investment in teaching and learning activities; in other words, the more similar the institutional environment of the host country, the more firms invest in teaching and learning. For firms with a relatively limited resource base, similarity to the host environment eases knowledge sharing.

Table 4: Results for deciding to engage in teaching and learning activities

Outcome variable: Extent of teaching and learning strategies				
	Unstandardised beta	Std. error	t-value	Sig.
(Constant)	*3.874*	*2.253*	*1.719*	*0.093*
Age	**0.098**	**0.029**	**3.447**	**0.001**
Size	***0.991***	***0.418***	***2.371***	***0.023***
Relative competitiveness of US industry	-9.405	8.343	-1.127	0.266
Institutional dissimilarity of country to US	***-5.588***	***2.289***	***-2.441***	***0.019***
Centre of excellence status	***0.063***	***0.026***	***2.435***	***0.019***
How well knowledge partners know each other	**1.574**	**0.452**	**3.484**	**0.001**

Model summary	R	R^2	Adjusted R^2	Std. error of the estimate
	0.699	0.488	0.411	2.3871

ANOVA	Sum of squares	df	Mean square	F-value	Sig.
Regression	217.170	6	36.195	**6.352**	**0.000**
Residual	227.936	40	5.698		
Total	445.106	46			

Significant at the 0.1 level
Significant at the 0.05 level
Significant at the 0.01 level

Results for the extent of knowledge shared with the parent

For investment in the more developed world to result in the capability upgrading of the developing country firm, knowledge has to be shared with the parent. Table 2 offers marginal support for the general theoretical model, that the extent of knowledge shared with the parent is affected by the centre of excellence status, and by the extent of teaching and learning strategies between the subsidiary and the parent. In this final model, the process is examined in more detail. In addition to examining the drivers for sharing knowledge (H6a and H6b) and the effect of ties to the less developed home country (H7a and H7b), I also investigate in greater detail which teaching and learning strategies are particularly important for the knowledge sharing of developing country firms.

The model (Table 5) is significant and has an R-square of 35.7%. In terms of the drivers for knowledge sharing, support is obtained for both H6a and H6b. In keeping with a large body of prior work on knowledge sharing, the variable for learning-by-doing, i.e. where knowledge sharing is integrated with everyday interactions with the parent, is significant. Support is also obtained for H6b. Strategically mandated knowledge sharing is

significantly but negatively correlated with actual knowledge shared. The findings indicate that assigning formalised "created asset seeking" mandates to developing country firms may be premature. For units that are struggling to survive in the more competitive USA, it is an unrealistic expectation that they consciously share knowledge with the rest of the firm.

Table 5: Results for the extent of knowledge shared with the parent

Outcome variable: Extent of knowledge shared with the parent	Unstandardised beta	Std. error	t-value	Sig.
(Constant)	**58.520**	**21.158**	**2.766**	**0.010**
Age	0.354	0.293	1.207	0.238
Size	1.219	5.767	0.211	0.834
Relative competitiveness of US industry	-75.930	88.908	-0.854	0.400
Institutional dissimilarity of country to US	18.179	26.721	0.680	0.502
DRIVERS OF KNOWLEDGE SHARING:				
Learning-by-doing	*7.853*	*3.869*	*2.030*	*0.052*
Mandated by headquarters	*-8.646*	*4.394*	*-1.968*	*0.059*
TIES TO LESS DEVELOPED COUNTRY:				
Personal	1.097	4.114	0.267	0.792
Professional: Work experience at headquarters	-5.988	12.650	-0.473	0.640
Professional: Mentor at headquarters	**33.860**	**10.994**	**3.080**	**0.005**
TEACHING & LEARNING STRATEGIES:				
Permanent coordinator positions	2.141	4.176	0.513	0.612
Long-distance interaction	*6.837*	*4.003*	*1.708*	*0.099*
Face-to-face interaction: Worksite visits	5.796	4.139	1.401	0.172
Face-to-face interaction: Problem-solving meetings	***10.392***	***4.158***	***2.499***	***0.019***
Face-to-face interaction: Company-wide conferences / meetings	-1.161	4.090	-0.284	0.779

Model summary	R	R^2	Adjusted R^2	Std. error of the estimate
	0.756	0.571	0.357	23.3407

ANOVA	Sum of squares	df	Mean square	F-value	Sig.
Regression	20337.773	14	1452.698	***2.667***	***0.013***
Residual	15254.087	28	544.789		
Total	35591.860	42			

Significant at the 0.1 level
Significant at the 0.05 level
Significant at the 0.01 level

Only one tie to the home country has a significant impact on the extent of knowledge shared: The presence of a mentor there. There is therefore no support for H7a, and only partial support for H7b. A US-based executive will not share knowledge with the headquarters simply because of some work or personal experience in a country. Clearly, although the knowledge sharing of developing country firms takes place informally, it does

require some kind of professional facilitating structure. But because developing country firms are at an earlier stage in the evolution of their multinationality, the most effective facilitating mechanism is not institutionalised, but consists of an individualised engagement between partners of the headquarters in the less developed home country and of the subsidiary in the developed world.

A similar pattern can be seen from a more detailed review of teaching and learning strategies, where more formal teaching and learning strategies do not meaningfully affect the knowledge shared with the home country. Instead, learning takes place best when it is response to an immediate problem. The importance of joint problem-solving as a means of sharing knowledge is in keeping with a large body of prior research, and its significance is not unexpected.

The only other (marginally) significant variable is for long-distance interaction. Although the superiority of face-to-face (rather than distance) learning has become almost axiomatic in literature on firm learning, developing country firms benefit most from modes of interaction that are not considered media "rich" (Daft, Lengel, & Trevino, 1987). The word "rich" is perhaps doubly appropriate: For firms with more limited resources, long-distance interaction represents an accessible and affordable strategy to exchange knowledge. As in the case of their reliance on the (typically considered less valuable) transaction-based rather than relational resources of a location, the limitations in the resource base of developing country firms require of them to use perhaps less than optimal – but attainable – strategies to expand their capabilities in the more developed location.

DISCUSSION

This paper demonstrates that developing country firms do benefit from their presence in the developed world, but that their relatively more limited resource base shapes the process in four ways.

First is the role of similarity to the host environment. Penrose (1955) emphasises the importance of the confidence of managers that their plans will succeed, and I argue that for firms with a more limited capability base, confidence (and thus capability upgrading) is greatest where their firm is most similar to the host environment. For the purpose of accumulating capabilities in the host location, industry-level similarity is most important, and the greater similarity of the capabilities of US firms (i.e. their relative lack of global competitiveness) therefore facilitates subsidiaries' evolution into centres of excellence. For the purpose of sharing capabilities across borders, country-level similarity is most important, so that the greater similarity between the institutional infrastructure of the US and the home country best facilitates the flow of those capabilities back to the parent.

Second, the knowledge sharing process is characterised by the absence of formal mechanisms. Knowledge sharing takes place best when knowledge sharing parties know each other, and when it is integrated with work activities and work relationships. In fact, attempting to formalise knowledge sharing – whether by strategically mandating it or through instituting formal knowledge sharing mechanisms – detracts from the extent of knowledge shared. Because developing country firms in advanced host locations are preoccupied with surviving in the more competitive markets, the managerial resource base does not (yet) have the capacity to focus on explicit company-wide knowledge sharing.

Third, the process of creating and sharing capabilities is characterised by the use of mechanisms that may be considered less than optimal. For example, developing country firms benefit more from knowledge with a transactional than a relational dimension, and more from long-distance than general face-to-face knowledge sharing. The choice of

knowledge creating or sharing mechanism seems driven not by whether the option is optimal, but by whether it is available, given the more limited resource base of the firm.

Finally, the extent to which the subsidiary engages in knowledge sharing with the parent is positively correlated with its age and size, two indicators of the resource base of the subsidiary. This indicates that the expansion of capabilities through presence in the more developed world is a dynamic process, and that firms do over time develop more experience, capabilities and confidence in the host location. It is therefore likely that the above three points will over time become less important in explaining the knowledge creation of developing country firms in the developed world.

CONCLUSION

The results from the analysis clearly indicate that developing country multinationals are not leapfrogging into greater positions of strength, but that they evolve in an incremental fashion. In particular, the subsidiaries of developing country firms in the USA are evolving into centres of excellence, but their existing capability bases shape that process in important ways. The study confirms the ongoing importance of the internal resource base of the firm as the central determinant for the growth of the firm, confirming the appropriateness of a Penrosian paradigm even in this era of globalisation and increased access to information.

Although the strength of the findings is limited by the low response rate for the survey and specifically – because of the small population of developing country firms investing in the USA – by the low absolute number of completed surveys available for statistical analysis, the results consistently indicate the importance of less formal and even less than optimal (but accessible) learning strategies. One potential problem is non-response bias, although the clear finding that both the creation and sharing of knowledge take place "incidentally" rather than strategically suggests that responses were obtained from more than a subset of firms for which knowledge-seeking is particularly important. The main loss is thus in the specificity of the analysis, as the limited degrees of freedom forced me to use composite variables and principal components, and in some cases may have prevented me from uncovering the functioning of well-known mechanisms (for example, the effect of entry mode). Additional work is needed to further uncover how such mechanisms function.

This paper focuses on developing country firms that enter the developed world as fully-fledged competitors, rather than on the regularly described "R&D outposts" or "listening posts" (Kumar, 1998, Miotti & Sachwald, 2001, Narula, 2003) of developing country firms in the developed world. Once developing country firms enter the developed world as direct competitors, they need to focus all their resources on surviving in the more competitive context. This results in learning-by-doing and incremental upgrading, but also in the unavailability of resources that could have been used to invest in deliberate knowledge creation strategies. By not competing on the home turf of the strongest firms, and only entering with a formal created asset seeking mandate, developing country firms may mitigate some of the trade-offs documented in this paper. However, although the separation of knowledge creation from the firm's regular business activities may allow firms to escape some competitive pressures, it is also likely to fundamentally change the nature of firm learning, and is an important other avenue for future research.

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